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No. 2

The Ferns of Washington

T. C. FRYE AND MABEL McMURRY JACKSON

(Concluded from AMERICAN FERN JOURNAL, Vol. 4, No. 1, page 13, January-March 1914.)

6. ATHYRIUM.

Plants tall. Leaves herbaceous; petioles green or greenish, not filiform, the bundles concentric and uniting above into a 3-4-armed central bundle; scales delicate, of thin-walled cells. (Greek *a* = not, *thyreos* = a large oblong shield; apparently referring to the indusium.) We have only the following species.

1. *ATHYRIUM CYCLOSORUM* Rupr. (Plate 15. Plate 16, f. 1, 2.

Swamp Fern.

Leaves 1-6 feet high, tufted; petiole short, stout; blade narrow at base, thin and delicate when growing in shade but coarser when in sun, narrowly ovate, acute, 2 = pinnate; leaflets divided nearly to mid-vein, the margin serrate. Sori small, curved, forming more or less of a complete circle, on free veins, about half-way between mid-vein and margin; indusium membranous, opening along outer margin.—Alaska to Nebraska and Oregon.

7. ASPLENIUM. SPLEEN-WORT.

Plant small. Leaves evergreen, 1-pinnate; blade linear; leaflets regular in size except at very tip, oval or ovate; veins free; petiole filiform, the bundles either

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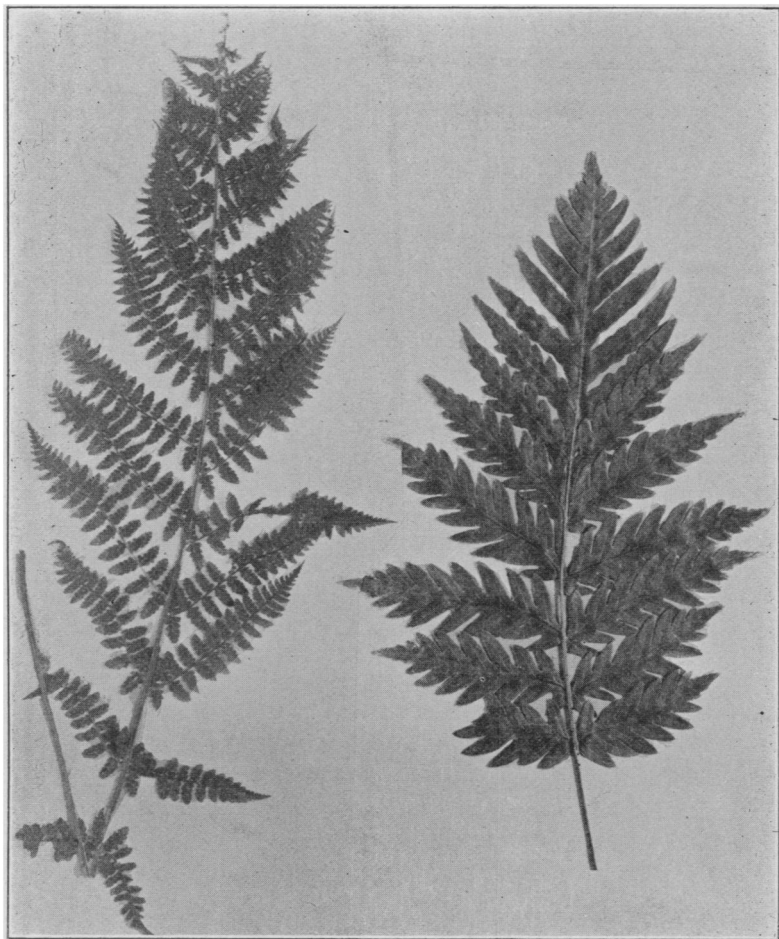


PLATE No. 15.

Left = *Athyrium cyclosorum*, $\times \frac{1}{4}$. Right = *Woodwardia spinulosa*, $\times \frac{1}{2}$.

separate and peripheral or united upward forming a lunate bundle. Sori oblong or linear, oblique to mid-vein, separate; indusium straight, opening toward mid-vein. (Greek *a* = taking away, *splen* = spleen; some were formerly supposed of value in spleen diseases.)

A. Petiole purple to brown, shining, round; leaflets 12-36 pairs, oval; margin crenate. 1. *A. trichomanes*.

AA. Petiole green, dull, flat; leaflets 6-20 pairs, ovate or rhomboidal; margin deeply crenate. 2. *A. viride*.

1. *ASPLENium TRICHOMANES* L. (Plate 16, f. 10, 11.)

Leaves 3-12 inches long, densely tufted; petioles purple to brown, shining, short; leaflets 12-36 pairs, nearly opposite, oval, the two sides often unequal, wedge-shaped or truncate at base, margin crenate.—Alaska to Nova Scotia, south to Arizona, Texas and Alabama.

2. *ASPLENium VIRIDE* Huds. (Plate 16, f. 8, 9.)

Leaves 2-4 inches long, thinly tufted; petioles flat and green except at base, often as long as blade; leaflets 6-20 pairs, ovate to rhomboidal in outline, upper edge narrowed suddenly at base, lower narrowed gradually, margin deeply crenate.—Alaska to Oregon, Colorado and Vermont; Europe; Asia.

8. *LOMARIA*.

Tufted; rhizomes erect. Sterile leaves shorter than the fertile and distinctly different; both kinds 1-pinnate (ours) or 2-pinnate; petiole not twisted. Sori parallel to the mid-vein of the leaflet, often covering almost the whole under side of the blade. (Greek *loma* = a border, probably referring to the indusium.) We have only the following species.

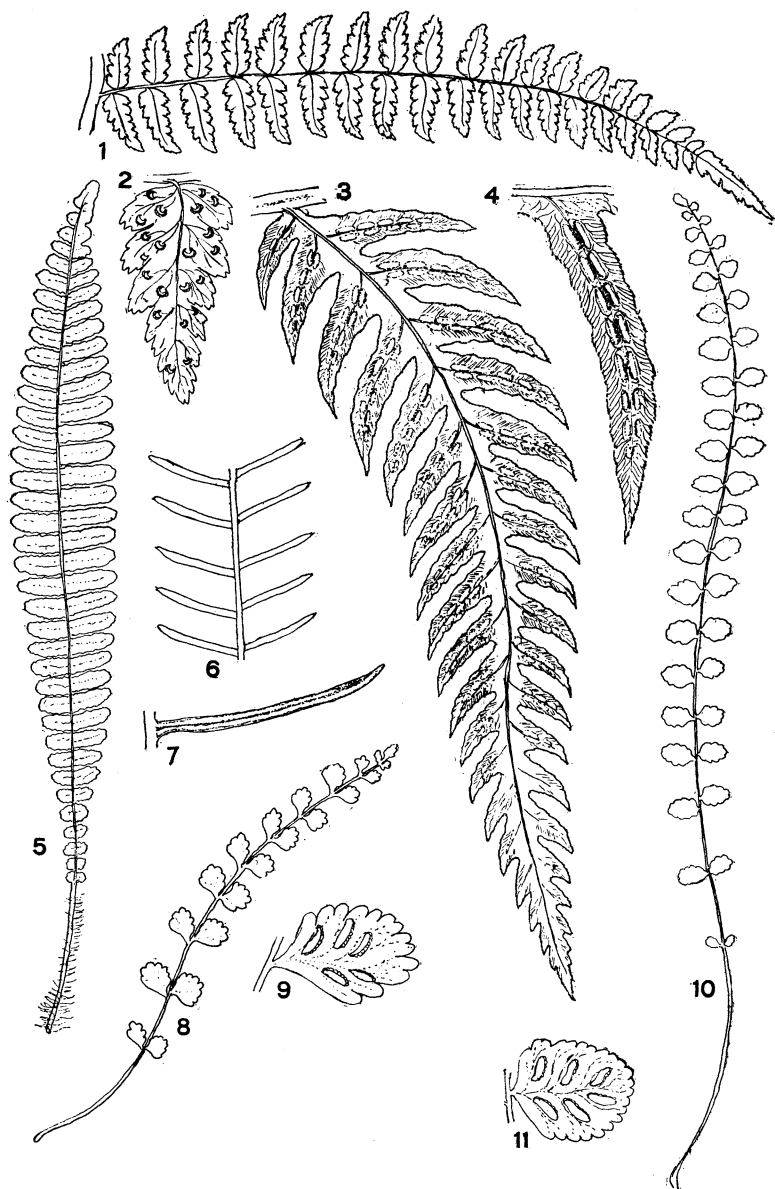


PLATE NO. 16.

1, 2 = *Athyrium cyclosorum*; 1 = a primary leaf-division, $\times \frac{1}{2}$; 2 = a leaflet, $\times 1\frac{1}{2}$. 3, 4 = *Woodwardia spinulosa*; 3 = a primary leaf-division, $\times \frac{1}{2}$; 4 = a leaflet or leaf-lobe, $\times 1$. 5, 6, 7 = *Lomaria spicant*; 5 = sterile leaf, $\times \frac{1}{8}$; 6 = a portion of the blade of a fertile leaf, $\times \frac{1}{2}$; 7 = a fertile leaflet, $\times \frac{1}{2}$. 8, 9 = *Asplenium viride*; 8 = a leaf, $\times \frac{1}{2}$; 9 = a leaflet, $\times 2$. 10, 11 = *Asplenium trichomanis*; 10 = a leaf, $\times \frac{1}{2}$; 11 = a leaflet, $\times 2$.

1. LOMARIA SPICANT (L.) Desv. (Plate 16, f. 5, 6, 7.)

Deer-Fern.

(*Struthiopteris spicant* Weiss; *Blechnum spicant* Sm.)

Leaves tufted, of two kinds, fertile longer than sterile; petiole of sterile leaf comparatively short; its blade 1-pinnate or pinnately lobed, coriaceous, linear to lanceolate, 8–24 inches long; leaflets oblique to mid-vein. Petiole of fertile leaves long; leaflets of fertile leaves narrower than sterile ones. Sori in a continuous band next to mid-vein of fertile leaflet, covered until mature by thin membranous indusium.—Alaska to California; Europe; Asia.—Often grown in houses for decorative purposes, because it withstands well the dry air and the shade of such a habitat. Eaten by deer in the spring.

9. WOODWARDIA. CHAIN FERN.

Plants large. Sori oblong to linear, in a chain-like row on each side of the mid-veins of the lobes of the leaflets; indusium fastened by its outer margin, inner side free and open. (Honor of T. J. Woodward, an English botanist.) We have only the following species.

1. WOODWARDIA SPINULOSA Mart. & Gal. (Plate 15, f. 2. Plate 16, f. 3, 4.)

Leaves 3–6 feet high; petiole long, stout; blade subcoriaceous, oblong to ovate, 1-pinnate; leaflets divided nearly to mid-vein, acute; their lobes wavy at margin, edged with fine spines; veins free from depressions to margin. Sori placed in little depressions formed between and by the veins; indusium convex.—British Columbia to California, Arizona and Mexico.

10. CEROPTERIS.

Leaves tufted. Sori along the veins, elongated; indusium none. (Greek *keras* = wax, *pteris* = fern; the back of the leaf is covered with a yellowish wax-like powder.) We have only the following species.

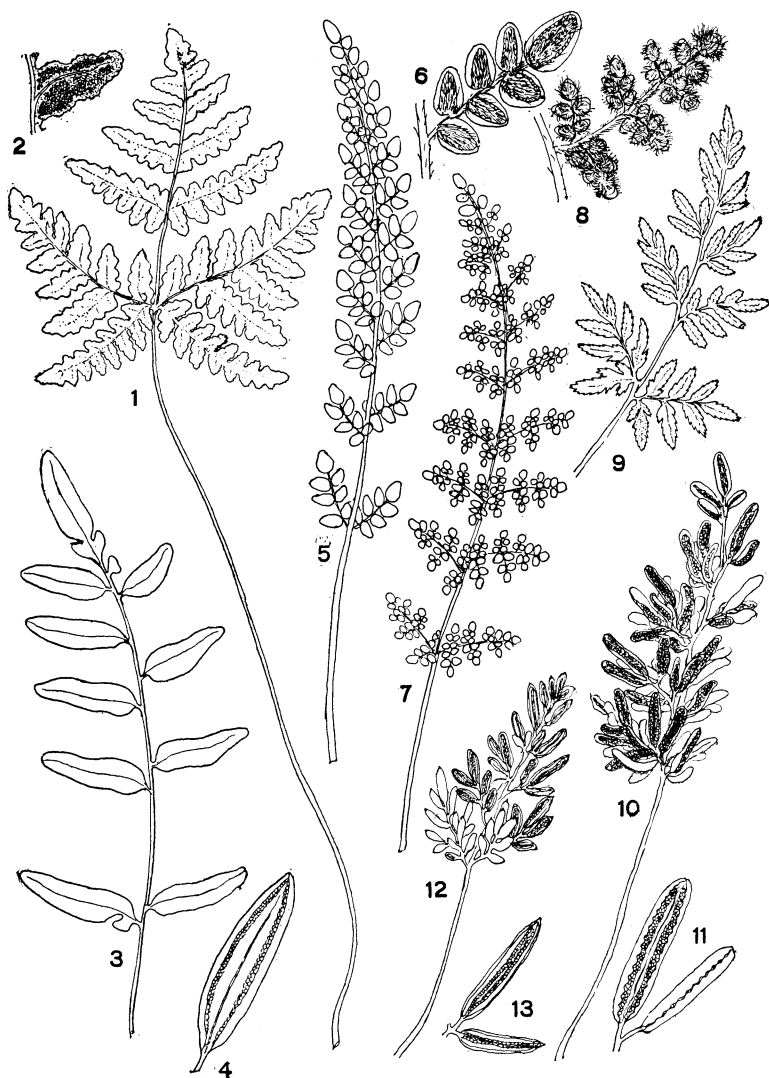


PLATE NO. 17.

1, 2 = *Ceropteris triangularis*; 1 = a leaf, $\times \frac{1}{2}$; 2 = a leaflet or leaf-lobe, $\times 1$. 3, 4 = *Pellaea occidentalis*; 3 = a leaf, $\times \frac{1}{2}$; 4 = the under side of a fertile leaflet, $\times 1$. 5, 6 = *Cheilanthes gracillima*; 5 = a leaf, $\times 1$; 6 = a primary leaf-division, $\times 2$. 7, 8 = *Cheilanthes Feet*; 7 = a leaf, $\times 1$; 8 = a primary leaf-division, $\times 2$. 9, 10, 11 = *Cryptogramma acrostichoides*; 9 = a sterile leaf, $\times \frac{1}{2}$; 10 = a fertile leaf, $\times \frac{1}{2}$; 11 = two fertile leaflets, under side, $\times 1$. 12, 13 = *Cryptogramma densa*; 12 = a leaf, $\times \frac{1}{2}$; 13 = two fertile leaflets, under side, $\times 1$.

1. CEROPTERIS TRIANGULARIS (Kaulf.) Under.
(Plate 17, f. 1, 2.)

Gold-back Fern.

(*Neurogramma triangularis* Deils; *Gymnopteris triangularis* Underw.)

Petiole 6–15 inches long, glossy, black; blade triangular to pentagonal, 1–5 inches long, nearly as broad as long, 3-pinnate; lower surface coated with a yellow to white waxy powder; lower pair of primary leaf-segments largest, triangular; segments rounded to obtuse at tip, crenulate. Sori nearly covering under surface.—On dry rocky slopes. British Columbia to California and Arizona.

11. PELLAEA.

Rock-ferns, small, tufted. Leaves 1–3-pinnate (1 in ours); petiole slender, brown, shining; leaflets of spore-bearing leaves narrower than those of the others but otherwise similar. Sori marginal, covered by the reflexed leaf-margin. Veins clearly visible in ours. (Greek *pellos* = dark; referring to the petiole.) We have only the following species.

1. PELLAEA OCCIDENTALIS (Nels.) Rydb. (Plate 17, f. 3, 4.)

Rootstock densely covered with rusty hair-like scales. Petioles glabrous; blades $1\frac{1}{2}$ –4 inches long, oblong, 1-pinnate; leaflets 2–6 pairs, not crowded, oblong, mostly obtuse, dark-green, shining, firm and somewhat coriaceous, entire or the lower ones with one or two lobes at the base; veins clearly visible. Indusium wide, wholly covering sori.—South Dakota to Wyoming and Washington.

12. CHEILANTHES. LIP FERN.

Small, tufted, rock-ferns. Leaves olive-green, 2–3-pinnate, more or less hairy; terminal leaflets the larg-

1. *CRYPTOGRAMMA ACROSTICHOIDES* R. Br. (Pl. 17, f. 9, 10, 11.)

Leaves light-green; blades 2-3-pinnate; sterile blades ovate to ovate-lanceolate, decidedly leaf-like, blade 1-4 inches long; leaflets of sterile leaves ovate, twice as long as wide, toothed or incised; leaflets of fertile leaves crowded, narrowly elliptical, 3-6 times as long as wide. Sori confluent at maturity, covering back of fertile leaflets.—Alaska to Great Lakes, Colorado and California.

2. *CRYPTOGRAMMA Densa* (Brack.) Diels. (Pl. 17, f. 12 13.)

(*Pellaea densa* Hook.)

Petioles wiry, 3-9 inches long, blades closely 3-pinnate, 1-2 inches long, ovate, coriaceous; segments linear, $\frac{1}{8}$ - $\frac{3}{8}$ inch long, nearly sessile, pointed or mucronate; fertile segments entire, margin recurved, bearing a membranous indusium on edge; sterile segments sharply serrate.—British Columbia to Wyoming and California.

14. ADIANTUM. MAIDEN-HAIR FERN.

Petioles black or dark brown, shining; leaflets with chief vein at lower margin, or none (ours). Sori marginal, borne on the under side of the inrolled leaf margin on the tips of free forking veins, oblong. (Greek *a* = not, *diaino* = to moisten; because the leaves shed water without getting wet.) Sometimes grown as a house plant. We have only the following species.

1. *ADIANTUM PEDATUM ALEUTICUM* Rupr. (Pl. 18, f. 1, 2.)

Maiden-hair Fern.

Blades smooth, thin, nearly circular in outline, 5-24 inches in diameter; petioles long, graceful, one or more times 2-forked, with the leaflets arising from the upper

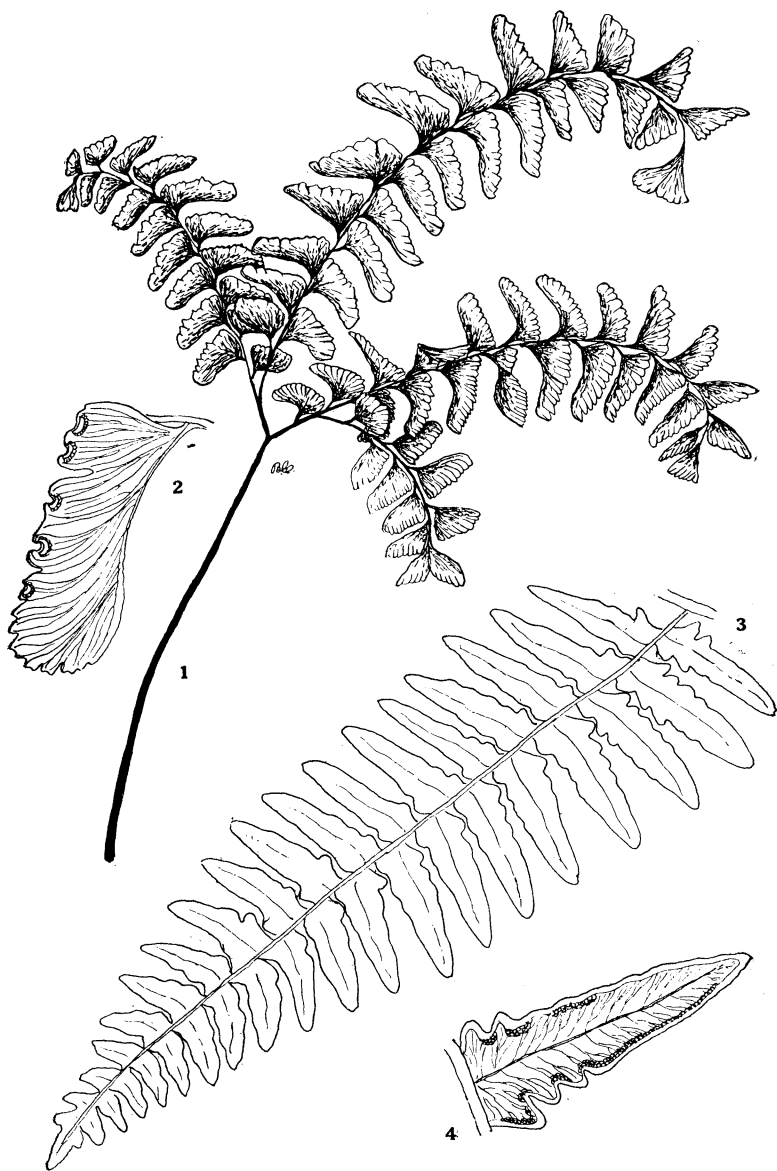


PLATE No. 18.

1, 2 = *Adiantum pedatum aleuticum*; 1 = a leaf, $\times \frac{1}{3}$; 2 = a leaflet, under side, $\times 1$. 3, 4 = *Pteridium aquilinum pubescens*; 3 = a part of a leaf, $\times \frac{1}{2}$; 4 = a leaflet, under side, $\times 1$.

side of its branches; leaflets delicately stalked, 1-sided. —In damp shady places. Alaska to Quebec, south to California.

15. PTERIDIUM. BRAKE.

Leaves not tufted; blade 1-3-pinnate (3 in ours), large. Sori marginal, continuous, under the inrolled leaf-margin, on a marginal vein which connects the ends of the lateral veins. (Greek *pteron*=wing, hence also Greek *ptēris*=a fern, because feather-like leaves are common in the group though not in this genus.)—The rootstocks were roasted and pounded, giving a flour used by the northwest Indians. The young shoots are eaten like asparagus by the French and Japanese. A bad weed in western Washington and Oregon. We have only the following species.

1. PTERIDIUM AQUILINUM PUBESCENS Underw. (Plate 18, f. 3, 4. Plate 19.)

Common Brake.

Rootstock stout, creeping, underground. Leaves 1-14 feet high, erect, covered with fine silky hairs especially beneath; petiole woody; blade triangular. Indusium double, outer formed of the incurved margin of leaf, inner attached within the receptacle and extending beneath the young sporangia.—The most common of our ferns.—Alaska to California and Arizona.

16. POLYPODIUM. POLYPOD.

Rootstock creeping, elongated; petioles articulated to slightly prominent knobs on scaly rootstocks; blade 1-pinnately divided. Sori round, large, naked, on tips of veins, one row on either side of mid-vein. (Greek *poly* = many, *pous* = foot, referring to the branched rootstock.)



PLATE No. 19.

Pteridium aquilinum pubescens, a leaf, $\times \frac{1}{4}$.

- A. Leaf-blade leathery, broadly ovate; margin of leaf-segments bluntly serrate. 1. *P. Scouleri*.
 AA. Leaf-blade membranous, linear to oblong.
 B. Leaflets or leaf-divisions acute or acuminate, their margin sharply serrate. 2. *P. occidentale*.
 BB. Leaflets or leaf-divisions obtuse, their margin entire. 3. *P. hesperium*.

1. POLYPODIUM SCOULERI Hook. & Grev. (Pl. 20, f. 1, 2.)

Leather-leaf Polypod.

Leaf-blade leathery, broadly ovate, 3-12 inches long; leaf-segments linear to oblong, obtuse, the teeth rounded. Sori on upper leaf-segments.—Near sea-water. British Columbia to California.

2. POLYPODIUM OCCIDENTALE (Hook.) Max. (Pl. 20, f. 5, 6.)

Licorice Fern.

Rootstock yellowish. Leaves 6-18 inches long; blade 1½-4 inches wide, oblong to linear, acuminate, membranous; leaf-segments numerous, tapering from a wide base to an acute or acuminate tip, sharply serrate; veins free, with 2-4 veinlets. Sori near mid-vein.—On rocks, logs and tree trunks. Alaska to California and along the coast.—The rootstocks have a strong licorice taste and are often collected by children for chewing.

3. POLYPODIUM HESPERIUM Max. (Pl. 20, f. 3, 4.)

Leaves membranous, 2-6 inches long; blade ½-1½ inches wide, linear to oblong, obtuse to acute; leaf-segments short, rounded at tip, crenulate to entire; veins free, 1-2-forked. Sori large, midway between mid-vein and edge.—On dry rocky hillsides. British Columbia to Montana and Arizona.

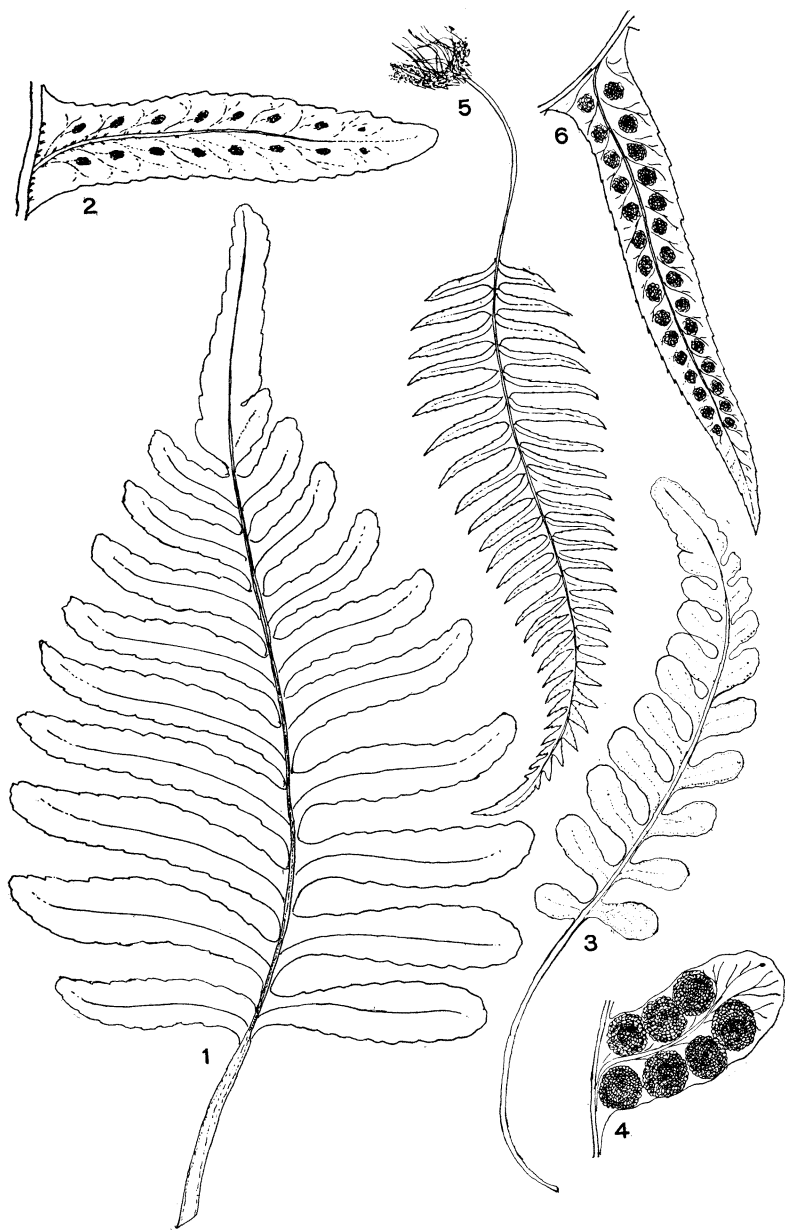


PLATE No. 20.

1, 2 = *Polypodium Scouleri*; 1 = a leaf, $\times \frac{1}{2}$; 2 = a leaflet, $\times 1$. 3, 4 = *Polypodium hesperium*; 3 = a leaf, $\times \frac{1}{2}$; 4 = a leaflet, $\times 1$. 5, 6 = *Polypodium occidentale*; 5 = a leaf, $\times \frac{1}{4}$; 6 = a leaflet, $\times 1$.

MARSILIACEAE. *Clover-fern Family.*

Perennial, rooted in mud; rhizome slender, creeping. Leaves either filiform or 4-foliate, long-petioled. Spore-leaves modified into spore-bodies (sporocarps) which are on peduncles arising near insertion of petiole of foliage-leaf. Spores of 2 sizes. We have only the following genus.

MARSILIA. CLOVER FERN.

Aquatic or in wet places; rootstock slender, creeping. Leaves palmately 4-foliate, resembling 4-leaved clover. Spore-leaves modified into spore-bodies (sporocarps) with two small teeth near base. (Honor of A. Marsili, an Italian botanist.) We have only the following species.

1. MARSILIA VESTITA H. & G. (Pl. 21, f. 1.)

Petioles slender, 2-5 inches long; blade $\frac{3}{8}$ -1 inch in diameter; leaflets wedge-shape or triangular to obovate, entire or slightly toothed, covered with soft white hairs. Spore-bodies (sporocarps) near leaf-base, on very short petioles, $\frac{1}{5}$ - $\frac{3}{8}$ inch long, $\frac{1}{8}$ - $\frac{1}{4}$ inch broad, densely covered with hair-like scales.—On wet silt or in shallow water. British Columbia to Kansas and Arizona.

SALVINIACEAE. *Floating-fern Family.*

Plants floating, small, somewhat elongated, sometimes branched. Leaves apparently in 2 rows. Spore-bodies (sporocarps) soft, thin-walled, 2 or more on the same stalk. Spores of 2 sizes in separate sporocarps. We have only the following genus.

AZOLLA. DUCK-WEED FERN.

Plants moss-like, pinnately branched; rootlets beneath. Leaves dense, imbricated, minute, 2-lobed. Smaller spore-bodies (sporocarps) acorn-shaped, con-

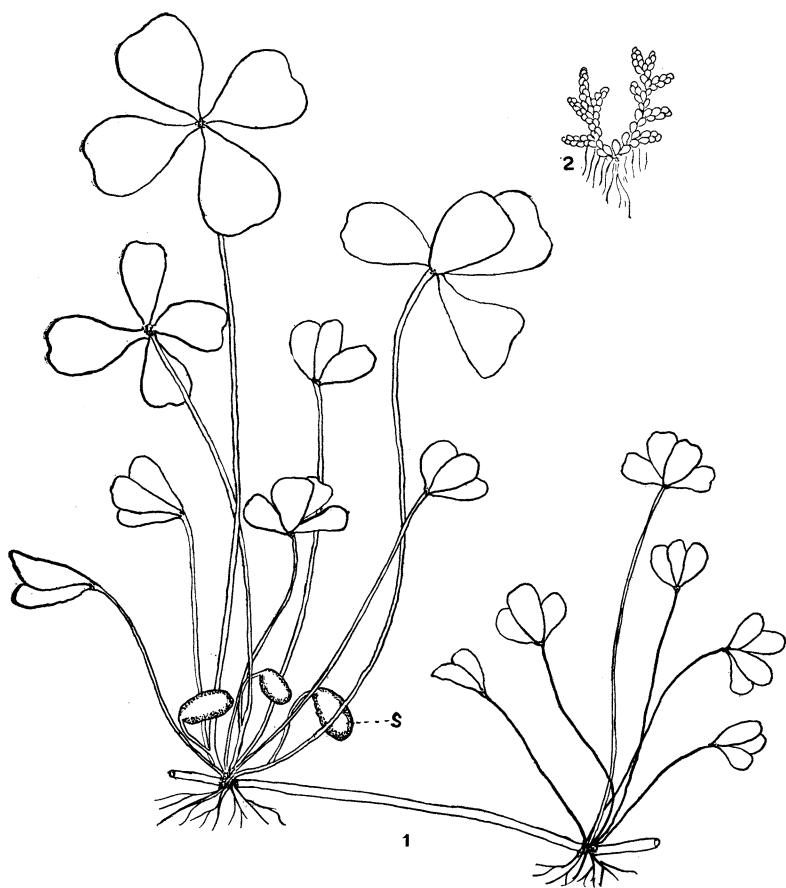


PLATE No. 21.

1 = *Marsilia vestita*, s = sporocarp, $\times 1$. 2 = *Azolla caroliniana*, $\times 2$.

taining 1 megaspore; larger spore-bodies (sporocarps) globose, containing many stalked sporangia which each contain several masses of microspores. (Greek *azo* = to dry, *ollupi* = to kill; referring to the rapid death when taken from water.) We have only the following species.

1. *AZOLLA CAROLINIANA* Willd. (Pl. 21, f. 2.)

Plants $\frac{1}{4}$ –1 inch long, reddish or greenish; sporocarps in the leaf axils. Cuticle of megaspore finely granulate. —British Columbia to Ontario, south to Florida and Mexico.

UNIVERSITY OF WASHINGTON, SEATTLE, WASH.

Ferns and their allies in Southern Franklin County, Maine.

CLARENCE H. KNOWLTON

Franklin County lies in western Maine, reaching from Canton, Rome, and Vienna, some 85 miles northwest to the Province of Quebec. It has an area of 1,764 square miles, about one-third larger than Rhode Island, or one-fifth the size of Vermont. It includes within its limits part of the Rangeley Lakes and most of the Sandy River valley. Of its 48 townships only about half are organized, and these occupy the southern portion of the county. The unorganized townships are covered with forests, mostly of the type called "Canadian," but there is also much hard wood.

My own acquaintance has been largely with the settled parts of the county, especially the region around my old home at Farmington, where I did my first fern collecting. Extensive collections of ferns have also been made in this region by Messrs. H. W. Jewell and A. H. Trundy, of Farmington, Miss L. O. Eaton, of Chesterville, and